Calling all maculas, not just you AMD (Part 1/2)

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GWCO
2022

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Disclosures

Leo Semes, OD, FAAO, FACMO

Speaker Bureau, Consultant - Maculogix

Speaker Bureau - Regeneron

Scientific Advisory Board - EyePromise

Stock options - Eye Promise (< 0.01% ownership), HPO (< 0.01% ownership)

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Course Objectives

Following this course, the attendee should

- appreciate the unusual presentations of neovascular complications of retinal disorders other than AMD but including some apparently trivial presentations
- recognize the implications and management of ocular toxoplasmosis
- gain a new perspective on the potential sight-saving measures for infectious processes
- recognize that not all macular disorders involving neovascularization are amenable to treatment with an anti-VEGF agent
- realize the potential prophylactic role of the OD in infectious maculopathies
- be able to triage macular disease for successful outcomes and appropriately counsel the patient with such presentations.

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Disclaimer

"Half of what you'll learn during training will be shown to be either dead wrong or out-of-date within 5 years ;

…the trouble is that nobody can tell you which half."

-David Sackett, MD

Widely regarded as the father of evidence-based medicine (1938-2015)

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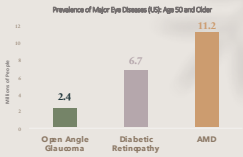
What is unique about the Oregon state flag among state flags?

5

Leading Cause of Legal Blindness in the US

Clinical AMD
is more prevalent
than glaucoma &
diabetic retinopathy
combined

(Statistics from the AAOphth)



Sources: https://www.aao.org/newsroom/eye-health-statistics#_edn4; https://www.nei.nih.gov/learn-about-eye-health/resources-for-health-educators/eye-health-data-and-statistics/diabetic-retinopathy-data-and-statistics/diabetic-retinopathy-tables; https://www.nei.nih.gov/learn-about-eye-health/resources-for-health-educators/eye-health-data-and-statistics/age-related-eye-disease-studies-ared-statistics/vision-problems-ared-tables

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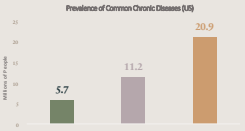
AMD is a Major Health Problem & Economic Burden

AMD presents serious consequences for the US population as a whole

Prevalence of Common Chronic Diseases (US)



Focus on this number

Total loss in gross domestic product in the US due to AMD is estimated at more than **$41B**

DISEASE STAGE	DIRECT MEDICAL COSTS	DIRECT NON-MEDICAL COSTS	INDIRECT COSTS
Drusen	Outpatient monitoring	None	None
Dry	Outpatient monitoring, Vitamins/ supplements	Living aids, Home modifications	Caregiving, Lost productivity
Wet	Outpatient monitoring, Treatment	Living aids, Home modifications	Caregiving, Lost productivity

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Geographic atrophy
(the 90 in the 90/10 rule)

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Natural Course of AMD

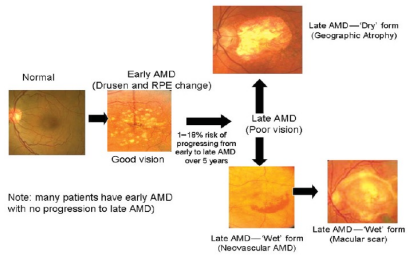

Fig. 1 Classification of age-related macular degeneration.

British Medical Bulletin 2008;85

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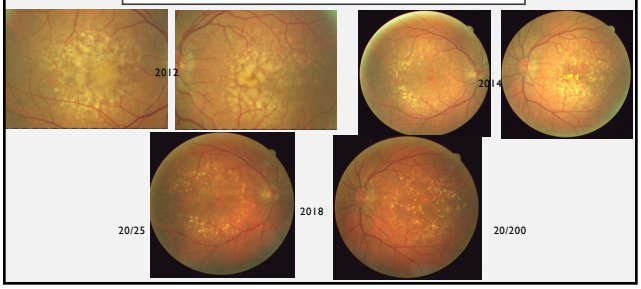
GA PROGRESSION DOCUMENTED WITH CFP



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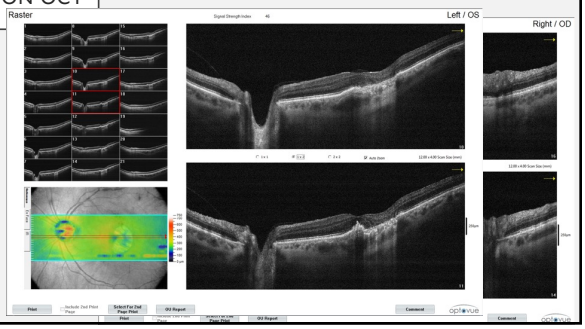
GA ON OCT



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Let's look at pathogenesis of AMD, beginning with RPE

Role of retinal pigment epithelium in age-related macular disease: a systematic review

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ABSTRACT
Age-related macular disease (AMD) is a major cause of blindness and there is little treatment currently available by which the progress of the basic disorder can be modulated. Histological and clinical studies show that the major tissues involved are the outer retina, retinal pigment epithelium, Bruch's membrane and choroid. Because of a wide variation of phenotype from one case to another, it has been suggested that accurate phenotyping would be necessary for assessment of the effectiveness of treatment that is tissue-directed. However, based on findings from the study of human donor material and animal models of disease and of cell culture. it is concluded that retinal pigment epithelial is a process occurring in some cases during the evolution of early disease. Intraocular injection of anti-vascular endothelial factor agents is an effective treatment for neovascularisation, but it is not designed to modify the evolution of early AMD. If correct, it would be concluded that, despite major initial therapeutic visual benefit, atrophy would predictably supervene as time progresses for which some clinical support exists.[7 8] These observations imply that the major objective of research should be directed towards the study of early AMD and the identification of potential therapeutic targets and mechanisms by which abnormal functions might be modulated.

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Conclusions

- The RPE is a critical nutritional transport element in the retina
- RPE stress may be the site of initial insult in all phenotypic expressions of AMD and may, therefore, serve as a potential therapeutic target
- The objective of such treatment would be restoration of lipid processing or energy restoration (think mitochondrial support)
- Mitochondrial-targeting peptides (e.g., elamipretide) are currently under investigation as is exposure to 670mn light

Br J Ophthalmol; 2021 Nov 1; 105 (11)1469-1474

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POTENTIALLY PROMISING TREATMENTS

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Pegcetacoplan (Apellis pharmaceuticals)

- Synthetic molecule that downregulates C3 and all complement pathways
- Delivered intravitreally
- Phase II Studies: 246 pts
  - At 12 mos, 29% lower rate of GA progression with monthly injections vs sham
  - No difference in visual acuity

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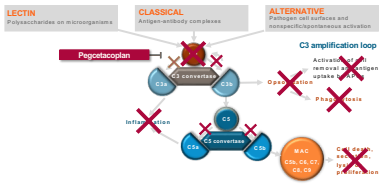
Targeting the complement pathway in GA



- Dysregulation of the complement cascade has been implicated in GA pathogenesis
- All 3 complement pathways end in the central cleavage of C3
- Pegcetacoplan is a pegylated, highly-selective peptide that binds C3, preventing its cleavage
- Inhibition of C3 blocks steps in the complement cascade needed for opsonization, inflammation, and formation of MAC

Figure adapted from Ricklin D, et al. Immunol Rev 2016;274(1):33–58.
APC=antigen-presenting cell; GA=geographic atrophy; MAC=membrane attack complex.
Liao DS, et al. Ophthalmology 2020;127:186–95.

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Pegcetacoplan

- Phase 3 DERBY and OAKS
  - Sept 9, 2021
- OAKS: met primary endpoint
  - 16%-22% reduction in lesion growth at 1 year
- DERBY: did NOT meet primary endpoint
  - 11%-12% reduction in lesion growth at 1 year
- Company moving forward
  - Hopeful to submit 1st half 2022
  - Hopeful approval end of 2022

Would be first FDA approved treatment for dry AMD!!

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Gyroscope therapeutics

- GT005: investigational gene therapy designed to induce expression of CF-I after subretinal delivery
  - CF-I down regulates CF
  - CF related to inflammation and GA lesion progression
- Stage II studies showed well tolerated and had positive effects on lesion size and acuity
- Phase III studies underway
  - Looking for pts with GA and CF-I rare variants (≅3-5%) vs all GA pts

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Let's look at some masqueraders

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86 YOWM

- Presents with reduced VA OS
- POH: repaired peripheral retinal hole SN OS X 11 yrs
- Pseudophakic in each eye
- Medicated for HTn X 20 yrs

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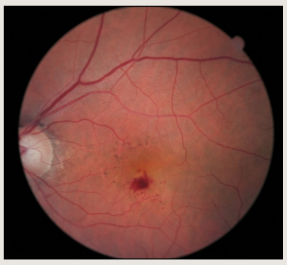
20/80
What's the diagnosis and management?



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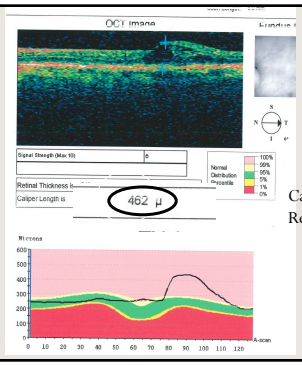

Baseline

Caliper to measure
Retinal thickness = 462 u

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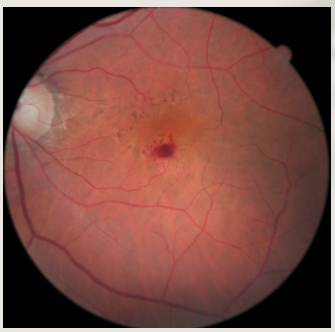
20/40 @ 1 week

S/P single IV a-VEGF



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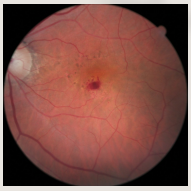
Retinal angiomatous proliferation

- Aka Type III neovascularization (intraretinal NV)
- Management
  - Avastin injection ⇒ 20/40 @ 3 weeks
  - 20/60 with 4 additional treatments @ 2 years



Neovascularization
Type I – CNVM
Type II – retinal teleangiectasia

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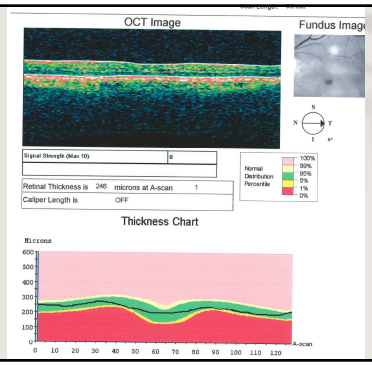
S/P 1 Avastin injection X 4wks



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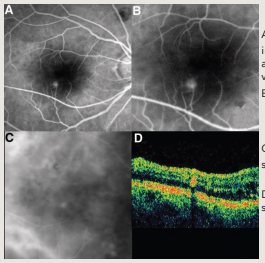

A. FA with early leakage of intraretinal vessels & accompanying teleangiectatic vessels.
B. Magnified view of RAP lesion

C. ICGA showing a single "hot spot."

D. TD-OCT showing RAP lesion shadowing deeper structures.

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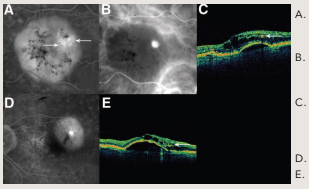
Another example (Stage II, w/PED)



A. RAP with hyperfluorescent PED [arrows]
B. ICGA with RAP hot spot, and hypo fluorescent PED
C. OCT; intraretinal RAP [arrow], cystic spaces and PED
D. Another RAP with PED
E. Arrow indicates intraretinal lesion; cystic spaces overlay PED

Yannuzzi LA, Freund KB, Takahashi BS. Review of retinal angiomatous proliferation or type 3 neovascularization. Retina. 2008 Mar;28(3):375-84.

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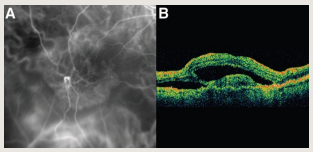

A. ICGA showing communication among intraretinal, subretinal and choroidal NV.

B. OCT shows choroidal invasion into subretinal space; RAP not well defined

Yannuzzi LA, Freund KB, Takahashi BS. Review of retinal angiomatous proliferation or type 3 neovascularization. Retina. 2008 Mar;28(3):375-84.

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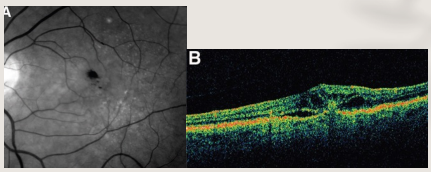

A. RAP [note drusen]
B. OCT suggesting choroidal invasion of subretinal space

Yannuzzi LA, Freund KB, Takahashi BS. Review of retinal angiomatous proliferation or type 3 neovascularization. Retina. 2008 Mar;28(3):375-84.

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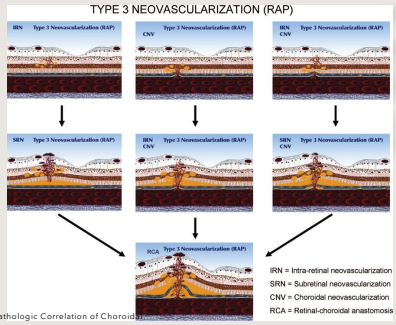

Klein M, Wilson DJ. Clinicopathologic Correlation of Choroidal and Retinal Neovascular Lesions in Age-Related Macular Degeneration. Am J Ophthalmol 2011;151:161-169.

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Stages of RAP

- Stage I: Intraretinal neovascularization (IRN)

  Parafoveal capillary proliferation that originates from the deep capillary plexus.

- Stage II: Subretinal neovascularization (SRN)

  IRN extends posteriorly into the subretinal space. A localized sensory retinal detachment develops, with intraretinal edema, intraretinal and preretinal hemorrhages, and an associated serous RPE detachment (RPED).

- Stage III: Choroidal Neovascularization (CNV)

  Seen clinically and angiographically, sometimes in association with a vascularized RPED. During this process, a communication between the retinal and choroidal circulations forms a retinal-choroidal anastomosis.

https://mail.google.com/mail/u/0/#inbox/FMfcgxvzLDzsNxwdSCZKgqqhgZgBQbKh

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Key points for contemporary management

- Anti-VEGF therapy is first line treatment
- Variable treatment response portends a guarded prognosis
- Future research will clarify pathophysiology, definition & classification well as optimal treatment

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Retinal Angiomatous Proliferation

- Questions
- Comments

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Vitreo-macular traction and adhesion

VMT vs. VMA

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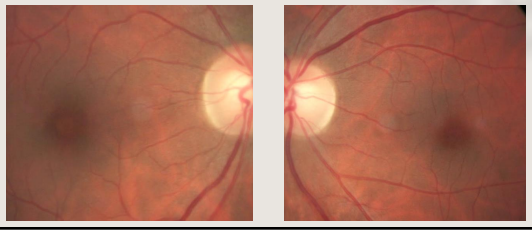
55 WF

3-day history of reduced VA OD

20/60 20/20



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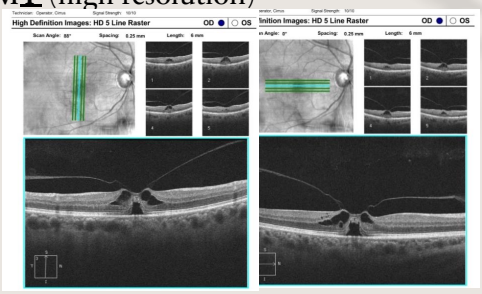
VMT (high-resolution)



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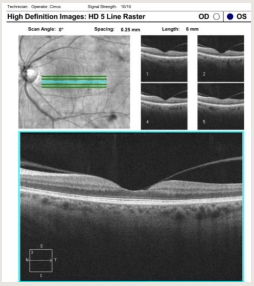
VMA

(20/20)



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International Vitreomacular Traction Study group Classification

Classification	Subclassification
Vitreomacular adhesion	Size: focal (≤1500 µm) or broad (>1500 µm) Isolated or concurrent
VMT	Size: focal (≤1500 µm) or broad (>1500 µm) Isolated or concurrent
Full-thickness macular hole	Size: small (≤250 µm), medium (>250–≤400 µm), or large (>400 µm) Status of vitreous: with or without VMT Cause: primary or secondary

Duker JS, Kaiser PK, Binder SP, et al. The International Vitreomacular Traction Study Group classification of vitreomacular adhesion, traction, and macular hole. Ophthalmology. 2013 Dec;120(12):2611-2619.

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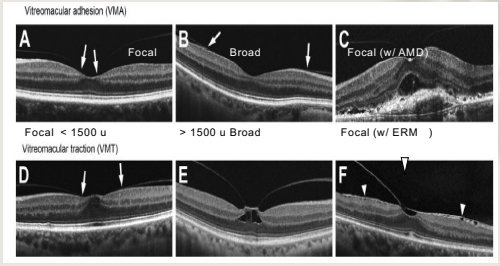

Duker JS, Kaiser PK, Binder SP, et al. The International Vitreomacular Traction Study Group classification of vitreomacular adhesion, traction, and macular hole. Ophthalmology. 2013 Dec;120(12):2611-2619.

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Table 2. Correlation between Commonly Used Clinical Macular Hole Stages and the International Vitreomacular Traction Study Classification System for Vitreomacular Adhesion, Traction, and Macular Hole

Full-Thickness Macular Hole Stages in Common Use	International Vitreomacular Traction Study Classification System
Stage 0	VMA
Stage 1: impending macular hole	VMT
Stage 2: small hole	Small or medium FTMH with VMT
Stage 3: large hole	Medium or large FTMH with VMT
Stage 4: FTMH with PVD	Small, medium, or large FTMH without VMT

FTMH = full-thickness macular hole; PVD = posterior vitreous detachment; VMA = vitreomacular adhesion; VMT = vitreomacular traction.

Duker JS, Kaiser PK, Binder SP, et al. The International Vitreomacular Traction Study Group classification of vitreomacular adhesion, traction, and macular hole. Ophthalmology. 2013 Dec;120(12):2611-2619.

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Natural course of *VMT*

- 11% of 53 patients developed spontaneous PVD (& release of traction) at 60 months F/U

Hikichi T, Yoshida A, Akiba J, Trempe CL. Natural outcomes of stage 1, 2, 3, and 4 idiopathic macular holes. *Br J Ophthalmol*. 1995;79(6): 517–520.

- 32% of 106 symptomatic patients had spontaneous PVD at 23 months F/U

John VJ, Flynn HW Jr, Smiddy WE, et al. Clinical course of vitreomacular adhesion managed by initial observation. *Retina*. 2014 March;34(3):442–446.

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VMA/T

- Questions
- Comments

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Case shared by Dr. Steve Ferrucci

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65 yo white male

- h/o OHS for many years
  - Laser OD 20 + years ago with scarring and poor acuity ≈CF
  - CNVM OS x 10 years, with 3 injections, VA stable since, ≈20/25
- In for 9 month follow up. Reports stable vision with no active issues
- CF OD
- 20/25 OS

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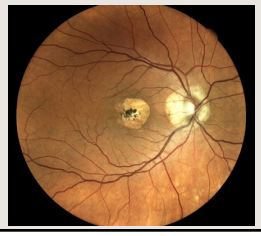
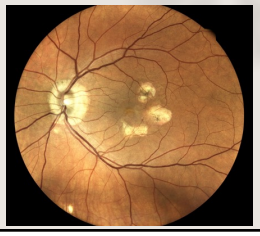
OHS

CF *20/25*





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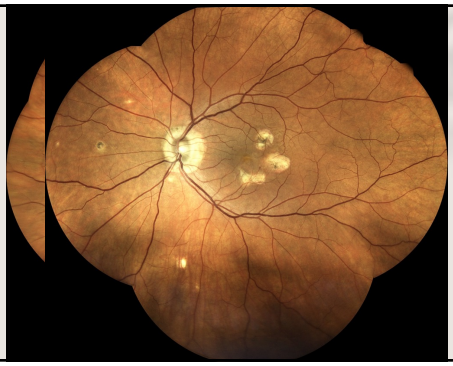

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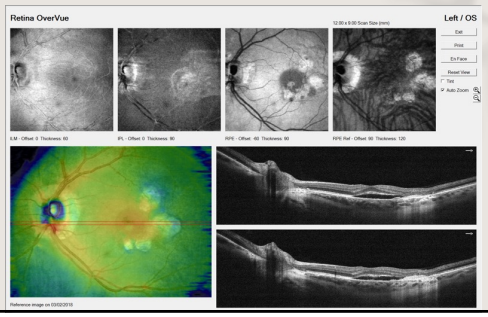
WIDEFIELD



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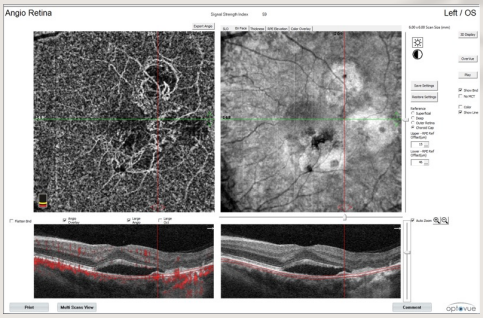

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65 yo white male

- ASSESSMENT
  - OHS with reactivation CNVM OS
- PLAN
  - Avastin x 3
  - RTC for repeat OCT, OCTA after 3rd injection
  - Pt agrees with plan
  - Monoc precautions including Polycarbonate lenses

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OHS

- Questions
- Comments

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All you need to know about differentiating ocular histo from toxo

- Histoplasmosis
  - Fungal organism
  - Vector is fowl guano with geographic predispositions
  - Affects Lungs OR Eyes
  - Triad of ocular signs
    - perihpheral "histo spots"
    - parapapillary atrophy
    - macular involvement
  - Histologically is a primary choroiditis
  - Ocular involvement - treat
- Toxoplasmosis
  - Obligate intracellular parasite
  - Vectors are multi (but NOT fowl) with regional predictions
  - Systemic involvement
  - Ocular signs
    - peripheral scarring
    - REACTIVATION
  - Histologically is a primary retinitis

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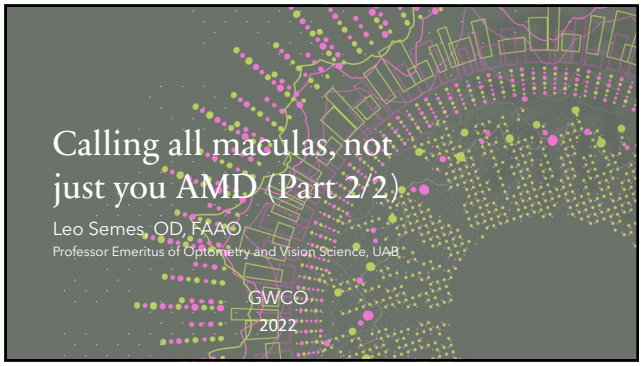

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Case: 39 W/M

- Initial presentation:
  - Desires second opinion on treatment for retinal problem
  - History: taking clindamycin X 6 weeks PO + steroids PO X 3 weeks (D/C)
  - VA (OD) 20/200, mild vitritis, no A/C rxn., all else unremarkable; OS uninvolved
  - DDX???

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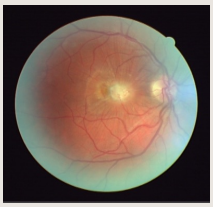
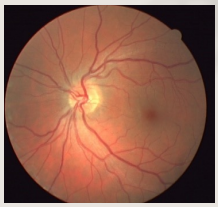
39 W/M

- OD Fundus appearance @ initial presentation





Uninvolved fellow (20/20)

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39 W/M

- Initial treatment
  - *Bactrim DS* (160 mg. Trimethoprim + 800 mg. Sulfmethoxizole)* PO bid X 2 weeks
  - RTC X 2 wks

Current recommended treatment when offered.
Lima GSC, Saraiva PGC, Saraiva FP. Current therapy of acquired ocular toxoplasmosis: a review. J O P T. 2015 (Sep): 511-517.

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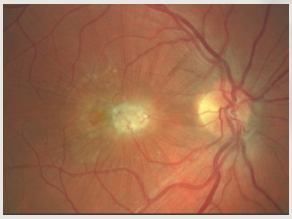
39 W/M

- 2- week return visit (fundus appearance)



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39 W/M

- VA unchanged
  - Vitritis slightly diminished
  - Fundus appearance essentially unchanged
  - Options
    - Continue meds???
    - Change meds???
    - Add meds???
    - Refer???

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39 W/M

- 4-week return visit
  - VA unchanged
  - Vitritis resolved; 1+ A/C reaction
  - Fundus appearance essentially unchanged
  - Options
    - Continue meds???
    - Change meds???
    - Add meds???
    - Refer???

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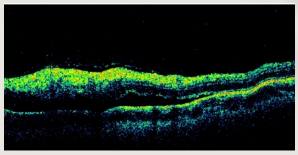
39 W/M

- 8-week return
  - Patient C/O itch on shoulders and back
  - VA 20/100
  - A/C reaction resolved
  - Fundus remodeling apparent
  - Now what ???

85

OCT features of Toxoplasmic ***retino***choroiditis

- Reflective inner retina in active presentations
- Posterior hyaloid thickened and detached over the lesion
- Shadowing of the underlying choroid
- May have serous fluid



Monnet D, Averous K, Delair E, Brézin AP. Optical coherence tomography in ocular toxoplasmosis. Int J Med Sci. 2009;6(3):137-8.

86

Management of Ocular Toxoplasmosis

- Clinical Presentation / Diagnosis
  - Observation of a yellowish lesion with overlying inflammatory cells is almost diagnostic
  - Vitritis/choroiditis may accompany
  - Blood tests are definitive (systemic) but not in ocular
    - Sabin-Feldman methylene blue dye test, IgG, IgM, ELISA)
  - Treatment is indicated when the posterior pole is involved

87

Ocular Toxoplasmosis

- 30% - 50% of all cases of posterior uveitis
- Clinical presentation (same for cong. and acq.)
  - Focus of necrotizing retinitis
  - Moderate to severe vitritis
    - In immunocompromised patients, there may be multiple foci or extensive necrosis

88

Ocular Toxoplasmosis

- Clinical epidemiology
  - 1 billion infections worldwide
  - More prevalent in tropical climates
  - US seropositivity: 3-70% of adults
  - Prevalence 6%
    - Ratio: acq. 10X more common than cong

Da-la-Torre A, et al. Screening by ophthalmoscopy for *Toxoplasma* retinochoroiditis in ***Columbia***. Am J Ophthalmol 2007; 143: 354.

89

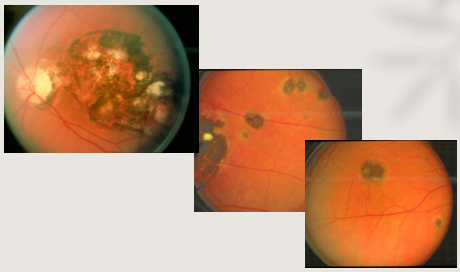
Other Toxoplasmic Retinochoroiditis Risks

- *Eating locally produced cured, dried, or smoked meat*
- *Working with meat*
- *Drinking unpasteurized goat's milk*
- *Having 3 or more kittens*
- *Eating raw oysters, clams, or mussels was significant in a separate model among persons asked this question.*

Jones JL, et al. Risk factors for *T. gondii* infection in the United States. Clin Infect Dis. 2009 Sep 15;49(6):878-84.

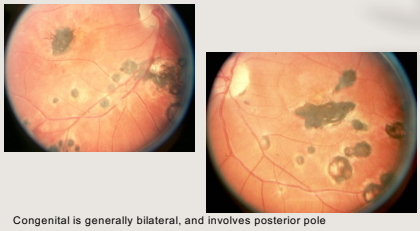
90

Post-inflammatory lesions



91

Post-inflammatory lesions ("congenital toxo")



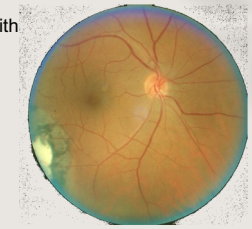
Congenital is generally bilateral, and involves posterior pole
Reactivation is not unexpected…

92

92

Inactive retinochoroiditis

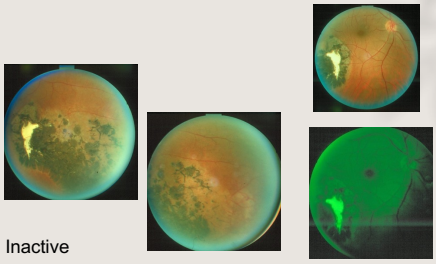
- 58 B/M presents with near complaints
  - VA – 20/20



93

93

Inactive Retinochoroiditis

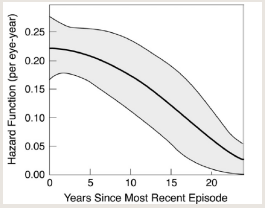


Inactive

94

94

Recurrences (risk)



•While risk appears to decline with increasing time from most recent episode, risk may be accelerated by increasing age (interactive factors).

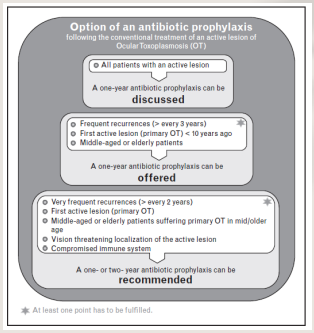
•Holland GN, et al., Analysis of recurrence patterns associated with toxoplasmic retinochoroiditis. Am J Ophthalmol. 2008 ;145(6):1007-1013.

95

95

Prophylaxis ?

- Current guidance



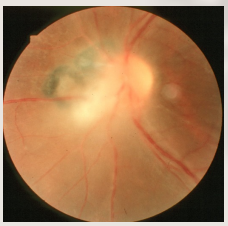
Reich M, Mackensen F. Ocular toxoplasmosis: background and evidence for antibiotic prophylaxis. Curr Opin Ophthalmol 2015; 26 (Nov): 498-505

96

96

QUIZ TIME

- 16 W/M
- Slight decrease in VA recently
- VA = 20/40 (OS), DX = ?
- DDx = ?



Active lesions are white and fluffy with vitritis.
(a controversial indication to all oral prednisone)

97

97

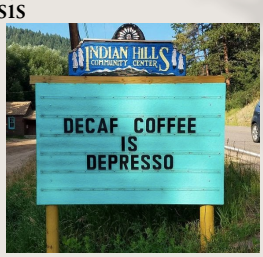
All you need to know about differentiating ocular histo from toxo

- Histoplasmosis
  - Fungal organism
  - Vector is fowl guano with geographic predispositions
  - Affects Lungs OR Eyes
  - Triad of ocular signs
    - perihpheral "histo spots"
    - parapapillary atrophy
    - macular involvement
  - Histologically is a primary choroiditis
  - Ocular involvement - treat
- Toxoplasmosis
  - Obligate intracellular parasite
  - Vectors are multi (but NOT fowl) with regional predictions
  - Systemic involvement
  - Ocular signs
    - peripheral scarring
    - REACTIVATION
  - Histologically is a primary retinitis

98

Ocular Toxoplasmosis

- Questions
- Comments



99

PL, 1982
Dx: CSR (OS, 20/30)

now mac hole and GA
(1998)

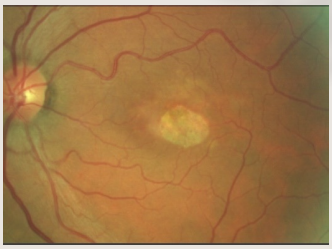
20/60

100

PL, 1982
Dx: CSR (OS, 20/30) *now mac hole and GA*

(1998)

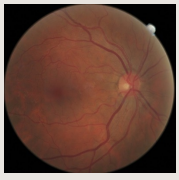
20/60

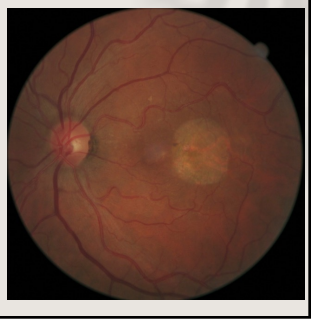


101

(2008)

20/20; 20/80

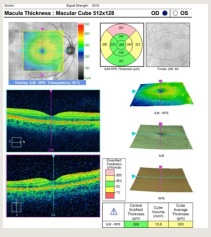


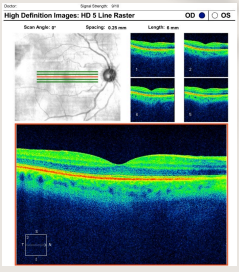


102

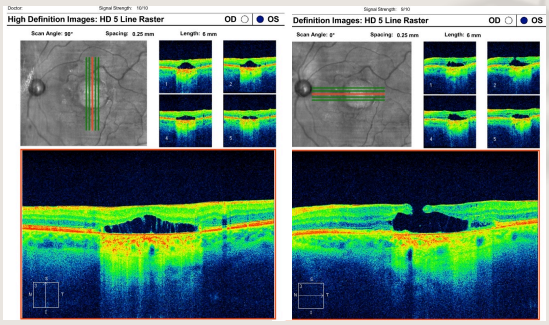
(2012)

PL; OD 20/20





103



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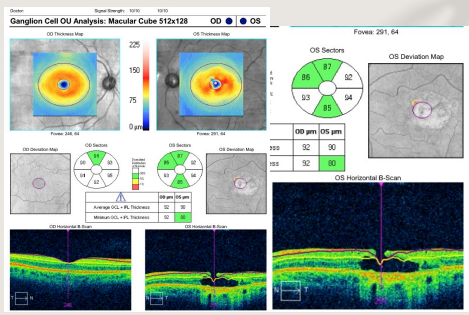
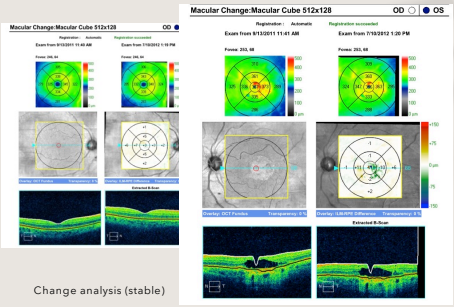


105



Change analysis (stable)

Note how the instrument is "fooled" OS

106

- "…central serous is not an innocuous disease."

- R. Morris, MD (c. 1982)
("Retinologist")

JP

107

Let's look at an acute case

108

46 Asian Male

- "blurry vision"
  - X 3 mo OS; began only last night OD
- Began new BP med last week
- Has never had eye exam
- Central blur in OS has improved somewhat
- + floaters X 1 yr
- - flashes, discharge, pain

109

46 Asian Male

- Previous ocular history is negative for refractive correction, injury, glaucoma, cataract, strabismus, amblyopia, etc.
- Family medical / ocular histories negative
- No known allergies
- Began lisinopril qD X 1 wk. [ACE inhibitor]
- BP 150/100

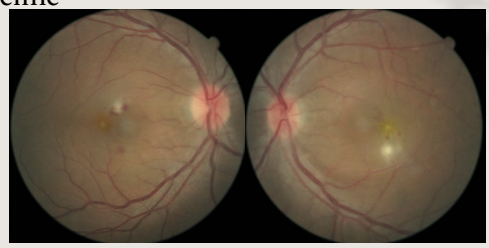
110

46 Asian Male

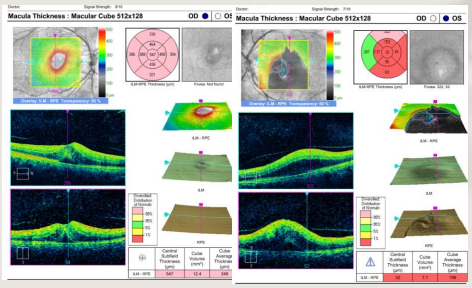
- VA 20/40- 20/400 (PHNI)
- -RAPD
- IOP: 14/14
- No EOM restrictions
- Confrontation FTFC OD, OS
- -1.50 / -2.25 -0.50 X 070 VA NI
- Anterior segment unremarkable OD, OS

111

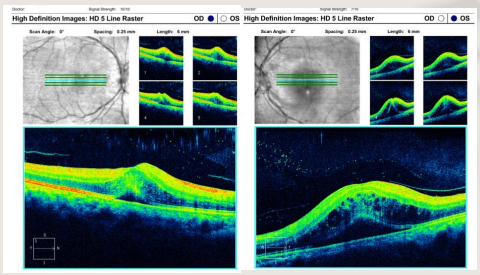
Baseline



112



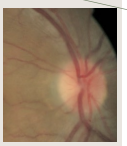
113



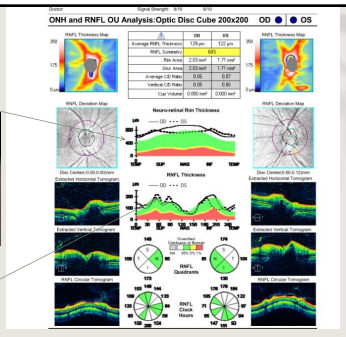
Note serous sub-retinal fluid and cystic spaces

114

Note disc margin elevation

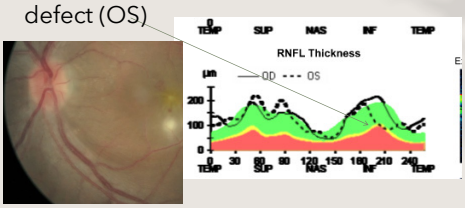


And CWS



115

And RNFL defect (OS)



116

46 A M with CSR, HR

- Initiated Nevanac bid
- RTC X 1 wk
- Correspond with PCP

- @ 1- wk F/U
- BP = 138/92
- VA 20/25 , 20/40 !!!
  - (-1.00 / -0.75 – 0.50 X 070)
- Continue Nevanac bid

117

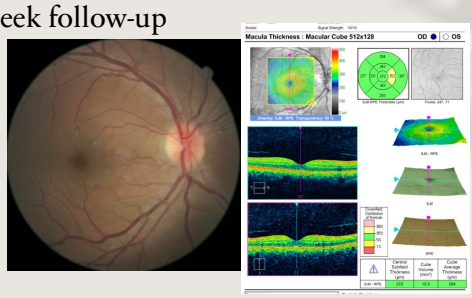
46 A M with CSR, HR

- Initiated Nevanac bid

- @ 2- wk F/U
- BP = 140/92
- VA 20/20- , 20/20- !!!
  - (refraction unchanged)
- Continue Nevanac bid
- RTC X 1 Wk

118

3-week follow-up



D/C Nevanac

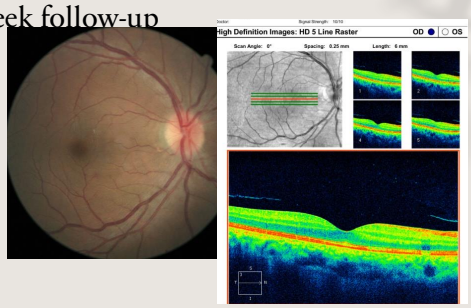
119

3-week follow-up

D/C Nevanac

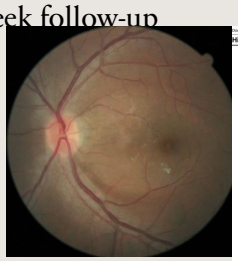
120

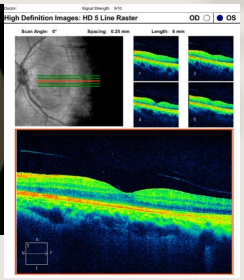
3-week follow-up



121

3-week follow-up





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CSR

- Questions
- Comments

Recent support for topical NSAIDs for acute CSR

Bahadorani S, Maclean K, Wannamaker K, Chu ER, Gresores N, Sohn JH, Diaz-Rohena R, Singer MA. Treatment of central serous chorioretinopathy with topical NSAIDs. Clin Ophthalmol. 2019 Aug 15;13:1543-1548. doi: 10.2147/OPTH.S202047.

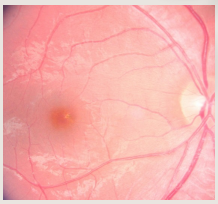
123

20 WM

- Laser injury to face with both eyes potentially involved

(Micra laser with a legend amplifier, 800nm, generally set at 2.5 watts, mode lock pulse laser)

- Persistent after-image; no further VA reduction subjectively
- VA 20/20 in each eye



124

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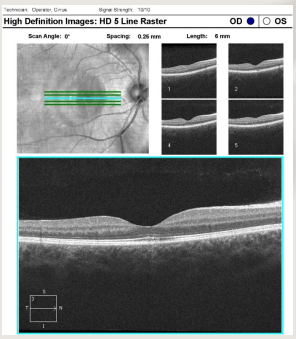
OD

Initial presentation (within hours of the incident)

Good signal strength

Minimal disruption of PIL

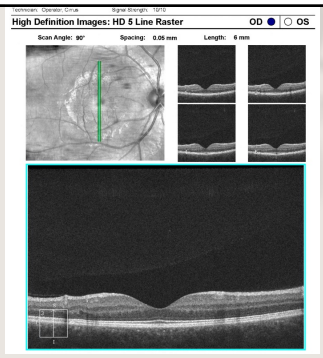


125

125

6-week F/U with ultra high resolution imaging

Vertical orientation shows intact and fully formed PIL

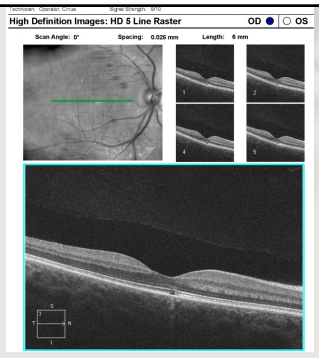


126

126

6-week F/U with ultra high resolution imaging

Horizontal orientation shows residual but minimal disruption of PIL



127

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J Pediatr Ophthalmol Strabismus. **2018 Sep 20**:55(5):312-318.

Laser Pointer-Induced Maculopathy: More Than Meets the Eye.

Mtanes K, Mimouni M, Zayit-Soudry S.

PURPOSE:
To describe the clinical findings in patients with laser-induced retinal injury.
METHODS:
Consecutive patients presenting to a tertiary center between January 2014 and December 2015 following inadvertent ocular exposure to a laser pointer were included. Evaluation included a full ophthalmic examination and spectral domain optical coherence tomography (SD-OCT).
RESULTS:
Seven young patients (8 eyes) were identified. Their mean age was 18.7 years (median: 16 years; range: 12 to 36 years). In most cases, patients were exposed for several seconds to a 5-mW green laser. At presentation, all patients complained of a central/paracentral scotoma. Snellen best corrected visual acuity (BCVA) at presentation ranged from counting fingers to 6/6. In 5 eyes, a round, well-defined deep yellowish-orange discoloration at the level of the retinal pigment epithelium in the fovea, ranging from 150 to 350 µm in diameter, was noted on ophthalmoscopic examination. Additional findings were macular subhyaloid hemorrhage in 2 eyes and a full-thickness macular hole with cystoid macular edema in 1 eye. In all cases, baseline SD-OCT revealed disruption involving the photoreceptor inner segment/outer segment junction/ellipsoid zone band, and extended toward the inner aspect of the retinal pigment epithelium band, ranging from focal interruption to extensive full thickness macular hole. All patients received oral corticosteroid treatment with prednisone (0.5 to 1 mg/kg). Follow-up ranged between 2 and 12 months. Over time, improvement in visual acuity to 6/8 and 6/6 was noted in all eyes, but one, which remained poor at counting fingers from 2 meters. The visual improvement was associated with complete or near-complete restoration of the integrity of macular structure noted on SDOCT.
CONCLUSIONS:
Commercial handheld laser pointers may inflict notable macular injury and damage vision permanently. Although good visual recovery was often noted, access to commercially available laser devices is potentially hazardous, especially to minors, and public awareness should be raised. J Pediatr Ophthalmol Strabismus. 2018;55(5):312-318.

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Summary

- 7 cases over 2 years; mean age 18.7 yrs (12-26)
- Exposure: several seconds, 5mW green laser pointer
- Presenting VA range: 20/20 to CF; all reported central/paracentral soctomata.
- Distance from source, spot size were not recorded.

(MPE calculation was, therefore, impossible)

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Summary

- 5 eyes showed ophthalmoscopic signs of round retinal discoloration (yellowish/orange)at the macula
- 2 eyes showed macular subhyaloid hemorrhage
- 1 eye had FTMH with CME
- Baseline SD-OCT revealed disruption of the PIL/ellipsoid zone band, and extended toward the inner aspect of the RPE band.

- Treatment = oral steroids 0.5 mg/kg/day.(e.g. 40 mg/80Kg)
- All but two eyes returned to 20/20 (20/40, CF 2 m.)
- Follow-up 2-12 mo.

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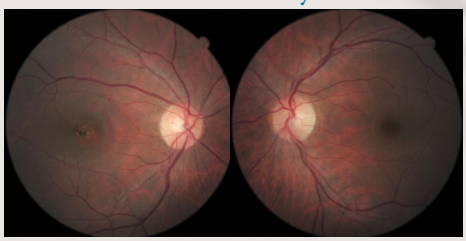
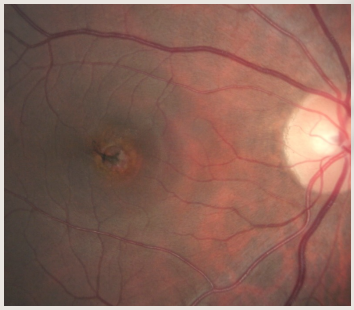
A little different story



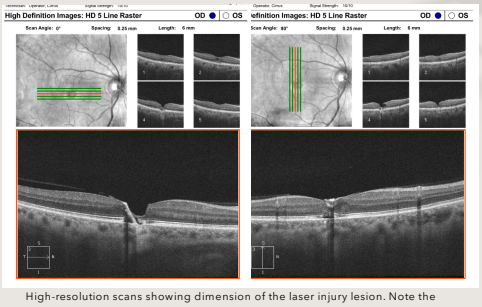
(Left) 5/25 Right macula with pigmentary disruption.
(Right) 20/20 Left macula is uninvolved

131



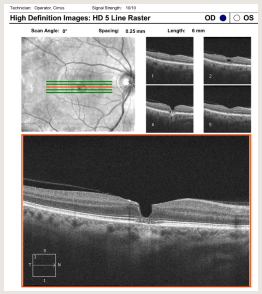
Close up of right macula. Note proliferative pigmentary response

132



High-resolution scans showing dimension of the laser injury lesion. Note the disorganization of the outer retina corresponding to other clinical findings.

133



Another cross-section through the right macula showing thickened inner retina and demonstrating vitreo-macular adherence. The outer retina is disturbed, as well.

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Photic laser injury

Accidental momentary exposure from commercial sources

vs.

Intentional exposure to lower powered sources (pointers)

135

Apparent acute laser injury report -2018

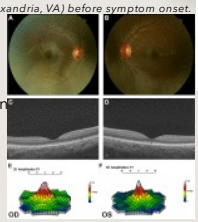
VA 20/30 OD
20/60 OS
Central scotomas on Amsler testing.

Bilateral subtle foveal granularity.

OCT revealed bilateral focal disruption in the ellipsoid and interdigitation zones subfoveally.

Multifocal ERG showed mild disruption in the central peak waveforms.

Playing Laser Maze (Thinkfun, Inc., Alexandria, VA) before symptom onset.



"beam bending laser game"

Klein KA , Baumal CR , Reichel E. Lessons Learned: Laser Retinopathy From Game Toy. Ophthalmol Retina. 2018 ;2 (9): 982-984.

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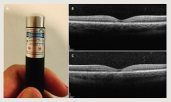
The latest (photic injury)

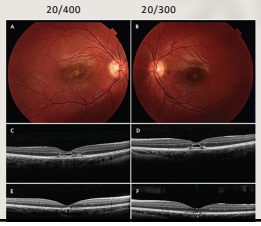
https://www.retinalphysician.com/issues/2020/june-2020/a-review-of-photic-retinopathy?eid=381062514&bid=2646985

- Two teen-agers (mentally distracted) who intentionally injured themselves.



Note outer retinal disruption

And, spontaneous resolution



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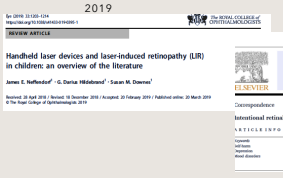
Laser-pointer abuse is a potential public health issue

2019



Handheld laser devices and laser-induced retinopathy (LIR) in children: an overview of the literature

James E. Neffendorf[a] · G. Darius Hildebrand[b] · Susan M. Downes[a]

2020

Journal of Affective Disorders

Intentional retinal injury with handheld lasers is an underrecognized form of self-harm

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1998:
"Don't get in car with strangers"

2008:
"Don't meet people from the internet alone."

2022
UBER..
Order yourself a stranger from the internet to get into a car with alone.

Laser retinal exposure

- Comments
- Questions

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Thank you

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